Intrinsic Capacity Factors and Activities of Daily Living among Older Adults Residents of Geriatric Homes

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ABSTRACT

Background: The loss of intrinsic capacity (IC) could result in activities of daily living (ADLs) impairment. Consequently, understanding the factors that influence levels and trajectories of overall capacity among older adults is of prime importance. **Aim:** Assess the relation of activities of daily living with intrinsic capacity and other risk factors among older adults residing at geriatric homes. **Methodology:** Descriptive correlational study, purposive sampling included 148 older adults residing at five geriatric homes. Five tools were used**:** (1) Older Adults Structured Interviewing Questionnaire regarding demographic characteristics and Health-related factors (2) Short Portable Mental Status Questionnaire, (3) Mini Nutritional Assessment short-form, (4) Short form of the Geriatric Depression Scale, and (5) Katz index of ADL. **Results:** 43.24% of elders displayed moderate functional impairment (assisted) and 14.87% demonstrated severe impairment ADLs (dependent). Multiple linear regression model revealed significant association between ADL and the IC factors of cognition, mobility ($p<0.000$); nutrition ($p<0.030$); vision ($p<0.015$). Furthermore, significant relations were found between ADL and demographic characteristics, age, social interaction ($p<0.000$), female gender ($p<0.026$), education ($p<0.001$). ADLs were also associated with morbidity including stroke, arthritis, and musculoskeletal problems ($p<0.000$), polypharmacy ($p<0.017$), and smoking ($p<0.000$). **Conclusions:** ADL is affected by several numbers of modifiable and non-modifiable risk factors. The IC appear to be important factors were associated with ADL, exception of the hearing factor and depression among older adults. **Recommendation:** Intervention strategies including geriatric health programs should be developed by health care professionals including nurses for preventing, or slowing declines in intrinsic capacity.

Keywords: Intrinsic Capacity, Activities of Daily Living, OlderAdults, Community Nurses.

Introduction

Ageing is an important part of all human life, today the world is facing a great challenge when the later stages of longstanding demographics transition from a high mortality and fertility pattern to low mortality within the 21st century (Al-Musafri & Shah, 2016). The demographic phenomenon of increased life expectancy has sparked debates on aging and the number of people of old age will continue to rise dramatically (Pereira et al., 2017). Nowadays, 600 million of the world's population are older than 60 years; this rate is expected to increase to 1.2 billion by 2025 and 2 billion people by 2050 (Sheikhhossein et al., 2020).

Egypt, like other countries, is experiencing the greatest increase in the older aged population. According to the official statistical agency of Egypt "Central Agency for Public Mobilization (CAPMAS)" 2018, the number of older persons, reached 6.410 million in 2018, divided into 3.418 million males, and 2.992 million females, which represents 6.7% of the total population, this number is expected to increase by 2031, reaching 11.5%, of the population. These demographic trends suggest that there will be an increase in age-related disability and dependence (Maresova, et al., 2019). This is interpreted by the fact of with the increase in life expectancy; there was a growth of the risk factors associated with chronic degenerative diseases that may be responsible to

affect the functionality of older people and consequently, may lead to a loss of ability to perform the activity of daily living (ADL's) (Pereira et al., 2017). The term ADLs is used to collectively describe basic skills necessary for independent living, including five basic categories; bathing, eating, dressing, continence, transferring and mobility (Edemekong et al., 2022).

In essence, it is interesting to explore these added years in terms of functional capacity and morbidity (Thiyagarajan et al., 2019). Recently, in the year 2015, an innovative public health model in the 'World Report on aging and health' proposed by the World Health Organization considers healthy aging from a functional perspective rather than the traditional disease-based perspective (Hu et al., 2020).

This new conceptual model defines healthy aging as "the process of developing and maintaining the functional ability that enables wellbeing in older age" and defines functional ability as the attributes related to health that allows a person to carry out their activities, which is determined by: (i) the "intrinsic capacity (IC)" of the individual, (ii) the environment in which they live (iii) and the interaction between the individual and these environments. Briefly, IC is a comprehensive indicator to evaluate older people's physical and mental health status as well as associated diseases. It is composed of five domains that are cognition, depression, mobility, nutrition as well as, sensory functions (hearing/ vision). The core of this novel theoretical framework resides in the comprehensive assessment of the different domains of IC and functional ability. Losses of ADLs are also generally only observed with very significant decrements of functioning, while the WHO model suggests that changes in IC are likely to start much earlier in life. Consequently, this model has great potential for supporting behavior modification toward healthy lifestyles by raising awareness about potentially deleterious declines incapacity and empowering the individual to take earlier action as these become apparent to maintain functional ability" (Cesari et al., 2018).

The shift in focus from disease to IC has major implications for nursing practice. Importantly, nurses are fully responsible for providing direct care to older persons. They must have geriatric knowledge to understand older people's complex problems, identify their needs, plan and provide high-quality care. Identifying the older adult's intrinsic capacity, functional and cognitive abilities early is an essential role of nurses to plan and implement interventions to maintain older adult' IC and function. Moreover, the nutritional promotion and enhancement of physical activity and are two essential strategies to enhance IC and delay the progress of frailty. Nurses promote selfcare capacity and independence through life course changes, they have a key role in the coordination of resources necessary to prevent further loss of function and decline in IC. (Amsalu et al., 2021 &Wang et al., 2017).

Significance of the Study

In fact, the right to health applies to all ages, including the later years of life (WHO, 2017). However, functional disability in old age is frequent and not only lowers the quality of life of its victims but depletes society's limited resources for assistance, care, and rehabilitation. Furthermore, geriatric homes appear to differ in their quality according to the residents' social status, besides more dependent patients may be a greater drain on the available resources than those who are ADL independent (Chen et al., 2019 and Mlinac & Feng, 2016). At the same time, the number of younger people who might be available to provide care will fall, and the societal role of women, who have been the main care providers, is changing (Thiyagarajan et al., 2019). One method to narrow the gap between increasing needs for healthcare and limited resources is to help older adults age successfully and independently (MacLeod et al., 2017).

Hence, it is of paramount importance to assess the functional capacity of the older adults residing at geriatric homes and its risk factors, interestingly, the loss of IC could result in ADL impairment, consequently understanding the factors that influence levels and trajectories of overall capacity could help to identify interventions and could be useful in self-care and clinical practice (Beard et al., 2019). However, there are no or even very few studies that evaluate relations between IC factors and ADLs among elderlies from **Egypt**, Africa, which is considered the second country with the

highest percentage of older adults (7%) in Arab countries. So, the results of the current study can contribute to help community health nurses in designing and implementing programs that support and promote active and healthy aging, maintain the independence of the elderly; and minimalize health deterioration in the future. As well, it will enrich the nursing curriculum for caring older adults, whereas, nurses in all settings including geriatric homes have the potential to influence positive outcomes for the health and functional status of older people. In the light of the above, the present study was conducted.

Aim of the Study

This study aimed to evaluate the relations of activities of daily living with intrinsic capacity and other risk factors among older adults residing at geriatric homes.

Research Questions

- **Q1.** What are the levels of functional impairment of activities of daily living among older adults residing at geriatric homes?
- **Q2.** What are the intrinsic capacity domains and other risk factors of activities of daily living among older adults residing at geriatric homes?
- **Q3.** Are there significant relations between activities of daily living with intrinsic capacity domains and other risk factors among older adults residing at geriatric homes?

Operational Definitions:

- **The activities of daily living (ADLs):** A fundamental skills required to independently care for oneself, such as eating, bathing, and mobility.
- **Intrinsic capacity (IC):** A component of all the physical and mental capacities of an individual, included the following domains: cognition, psychological, senses (vision/hearing), vitality/nutrition, and mobility.
- **Cognition:** A range of mental processes relating to the acquisition, storage, manipulation, and retrieval of information, decision making, memory, attention, and problem solving.
- **Depression:** A mood disorder that causes a constant feeling of sadness and loss of interest.

Methodology

Research Design

This was a descriptive correlation study. A descriptive design was used to describe the levels of functional impairment of ADLs, while the correlational design was utilized to explore I.C and the predictive factors that influencing ADLs amongst older adults residing at geriatric homes, Egypt.

Research Setting

The study was carried out on the older adults residing at five geriatric homes; settings with different social classes as a type of residential care that provide twenty-four hours primary health care and rehabilitation services as well as recreational services for the elderly residents. The five geriatric homes affiliated to the Ministry of Social Affairs namely Elhady El-Islamia, Day hospital institute for development and rehabilitation, El Hana home, and El-Resala Association for charity and Egyptian Women's Association. Elderly care is one of the different services provided in those five institutions.

Elhady El-Islamia elderly home includes 35 elders distributed on two floors, the first one included five shared rooms concerned for males while the second floor with four shared rooms for female elders. While the Elderly care home in the day hospital institute for development and rehabilitation, includes 11 elder residents on one floor of the institute distributed into six shared rooms. Elderly home care of El-Resala Association for charity, Naser city branch includes 11 older adults gathered on one floor divided into two flats, one flat concerned for males and the other for female elders, three shared room for each flat. El Hana Elderly home includes 35 geriatric residents distributed on six floors, three of these floors include twelve single and shared rooms while the last one includes two suites. The final geriatric home included in the current study is Egyptian Women's Association includes 99 elders distributed on five floors, covering 102 single rooms.

Sample

Purposive sampling was conducted which included older adults' resident of the previously mentioned settings. Their total numbers were 191 residents, 43 elderlies were excluded due to incomplete data, unacceptance participation in the study or had motor impairment affecting on ADLs. Therefore, the study sample was 148 older adult residents with a response rate of 77.48%.

Inclusion criteria: The participants, aged 60 years and above, of both genders, different educational level, living at the selected institutions, willing to participate in the study, and provided informed consent. **Exclusion criteria:** The elderly subjects with any medical disorder or any motor impairment that influences on functional status such as Parkinson's disease, limp amputation, and who refused to participate in the study, were excluded.

Tools of Data Collection

The independent/explanatory variables were assessed by the following tools:

Tool (1): Older Adults Structured Interviewing Questionnaire: it was developed by the researcher to collect the independent variables; it includes the followings parts:

- **Part (1)** Demographic characteristics such as age, sex, educational level, occupation, and marital status before entry to the geriatric home, family support, and social interaction with others as well.
- **Part (2)** Health-related factors that are focused on the medical condition to assess chronic diseases and the number of taken medication, smoking status, and sleeping. As well as, physical mobility and sensory functions (hearing and vision) as a part of IC factors.

Tool (2): The short form of the Geriatric Depression Scale (GDS-SF) (Sheikh &Yesavage et al., 1991) was used to assess the presence or absence of depression among the elders. This tool consists of 15 statements, the responses to each item are yes/no (scored 1 or 0), elders who score more than 5 positive items were considered to be depressed after reverse coding for five negatives items. An Arabic version of the test was applied **"**El-Husseini, 2013**"** that proved to be reliable and reported alpha Coefficients (α =0.80).

Tool (3): The cognitive function was measured by the Short Portable Mental Status Questionnaire (SPMSQ); it was developed by Pfeiffer (1975). This tool consists of 10 questions measuring orientation, memory, and arithmetic calculation. Scoring is constructed by summing up the number of incorrect answers of basic questions that were rated as 0 = the right answer, 1 = the wrong answer, with values of 0–2 (no impairment), 3-4 (Mild cognitive impairment, 5-7 (Moderate cognitive impairment) and 8-10 (Severe cognitive impairment). An Arabic version of the Questionnaire was applied that was approved to be valid and reliable in another study (Abdel Salam, 2012), where the reliability coefficient value was (α = 0.89).

Tool (4): Mini Nutritional Assessment short-form (MNA-SF), is an instrument designed by Nestle Nutrition Institute specifically for elderly people (Kaiser et al., 2009). An Arabic version was used (available at https://www.mnaelderly.com/forms/mini/mna_mini_arabic.pdf.). The short form consists of six questions relating to weight loss, appetite, mobility, psychological stress, neuropsychological problems, and some anthropometric measurements including Body Mass Index (BMI) and calf circumference (CC) if BMI is not available. Any question is graded between zero and two or three, with a maximum of 14 points. A ranking of 12 and above suggests a normal nutritional status; a value of 8-11 demonstrates a possibility of malnutrition and 7 or less implies malnutrition. The test reliability coefficient of the Arabic version was (α = 0.89).

Tool (5): The dependent variable, functional impairment, was assessed by the Katz index, of independence in ADLs (Katz, 1983), its most reliable method used to assess ADLs that are measured by the older adult's self-report or from his proxy caregiver. The index ranks adequacy of performance in the six functions of bathing, dressing, toileting, transferring, continence, and feeding. Participants were scored yes/no for independence in each of the six functions. The total point score of the scale is equal to six scores. A score of 6 indicates the

full function (Independent"), 4 indicates moderate impairment (i.e. assisted), and 2 or less indicates severe functional impairment (dependent). An Arabic version of the test was used in this study (El-Sherpiny et al., 2000). The test reliability coefficient of translated Arabic version was ($\alpha = 0.83$).

Validity

The questionnaires were translated to the Arabic language and retranslated to English, this version was compared with the original and anomalies were rectified by the same process. The content validity of the final Arabic version of the questionnaires was evaluated based on the feedbacks of five research experts in community health nursing and geriatric nursing specialty. The modifications of the tools were done according to the panel's judgment on the clarity of the sentences and the appropriateness of its content, the sequence of its items and the accuracy of scoring.

Pilot Study

A pilot study was conducted on 10% of the study sample to assess the feasibility of the study, clarity of the tools, and estimate the average time needed for data collection. The elders who participated in the pilot study were included in the study sample as no changes were needed.

Field Work

The data were collected from September 2021 to the end of January 2021 at five different geriatric home settings. After an explanation of the purpose of the study for each older adult who fulfills the study criteria, and obtained informed consent for the participation in the study either from the client or his family, data were collected through face-to-face interview with each participant individually and with his caregivers either family member or institutional caregiver. In addition, medical history from the medical records was reviewed. The time of the interview ranged from 45 – 75 minutes depending on the level of understanding and cooperation of the participant, where some of the participants need time for rest and return to complete the questionnaire.

Ethical Considerations

This study, approved by the Ethics Committee affiliated to the faculty of nursing, Modern for technology and information University. An official letter was given to the authority's personnel (the Ministry of Social Solidarity in Cairo and directors of all residential homes) to get the permission to carry out the study in the geriatric homes setting as well as informed consent for participants who are willing to participate in the study. All participants were fully informed regarding the purpose of the study, no potential risks associated with their participation and they have the right of withdrawing from the study without penalty. The participants' privacy and confidentiality were completely protected.

Statistical Design

Data entry and analysis were performed by using Statistical Package for the Social Sciences (SPSS, version 20). Descriptive statistical analysis was summarized as frequency count, percentage for categorical variables, and mean, median, standard deviation for quantitative variables. The association between functional impairment of ADL with the different independent variables (demographic and health related variables) was assessed using Chi-Square test and also, multiple linear regression model based on the enter method was used to find associations between dependent variable ADL and explanatory/ independent variables of IC (depression, cognition, nutrition, mobility, vision and hearing).

Results

Table (1) presented the sociodemographic characteristics; mean age is 72.52±2.14; 54.05% of the participants were males. 68.24% were widows/widowers and 71.62 % were working before entering the geriatric home.

Figure (1): presented that 37.84% of the studied older adults suffered from depression.

Figure (2): revealed that 26.35% of the older adults had mild cognitive impairment and 14.87% had moderate and severe cognitive impairment.

Figure (3): showed that 41.21% of the studied older adults were at risk for malnutrition, while 18.92% suffered from malnutrition.

Table (2): presented that the highest proportion of independent ADLs was feeding (74.32%), while, the highest proportion of dependency ADLs were bathing (59.46), and toileting (56.76%).

Figure (4): showed that 43.24% of older adults displayed moderate functional impairment (assisted) and 14.87% demonstrated severe impairment ADLs (dependent).

Table (3): revealed that assisted and dependency of ADLs among studied elders were higher among females (51.56% and 63.63% respectively) than males (48.43% and 36.36% respectively) with statistically significant differences (P<0.026). While higher independence of ADLs was found among elders who had higher education levels (20.96%) and those who had secondary education (48.39%) compared to those nonliterate elders (16.13%) with statistical significance differences (P<0.001). Independency was also higher among socially interacted elders (91.93%) than those who were not (8.07%) with statistical significance differences (P<0.000). The mean score of age was higher among dependent older adults (79.09±2.61) compared to those independent older adults (65.90±1.93) this difference was statistically significant (P <0.000).

Table (4): revealed relations between ADLs and the health-related variables. Older adults who were affected with stroke and arthritis or musculoskeletal problems had higher ADLs dependency (59.09% and 63.63% respectively, *P*<0.000). Dependency was also significantly higher among ex-smokers and non-smokers (54.54% and 45.45% respectively, P<0.00). A higher mean score of polypharmacy was also found among dependent older adults (3.913±1.698), compared to that of independent older adults (2.952±1.480), with statistical significance differences (P<0.017).

Table (5): showed that the highest proportion of dependency was among elders with moderate and severe cognitive impairment (59.09%) compared to those with normal cognitive function (18.18%). This difference was statistically significant (P <0.000). While independence was significantly higher among elders who had normal nutritional status (53.22%) compared to those malnourished (5.00%), with statistical significance differences (P<0.000). Older adults who were bedridden had higher dependency levels (68.18%) compared to those who ambulate with or without aids (0.00% and 31.82% respectively) with high statistical significance differences (P<0.000). Dependency was higher among elders with visual impairment (54.05%) compared to those without vision problems (9.10%) with statistical significance differences (P<0.007).

Table (6): demonstrated the result of the regression model that there was significant relationship between ADL and explanatory variables cognition, mobility (p<.000), nutrition (p<.030), and vision (p<.015), The explanatory/predictors variables explain of variations in ADL (R^2 = 64.7%), Model ANOVA: F= 43.052, (p<.0.000).

Table 1. Demographic Characteristics of the Older Adult Residents at Geriatric Homes (n=148).

Characteristics	n	%
Age groups:	67	
60 to < 69 years.	63	45.27
70 to 79 years.	18	42.56
≥ 80 years.		12.16
Mean± SD.	**72.52±2.14**	
Rang:	60- 82	
Median:	69.5	
Sex:		
Male	80	54.05
Female	68	45.95
Educational level:		
Non-literate	29	19.59
Primary school	46	31,08
Secondary school	53	35.81
University education	20	13.51
Marital status before entering the geriatric home:		
Single	23	15.54
Married	9	6.08
Widow /Widowers	101	68.24
Divorced	15	10.14
Occupation before entering to the geriatric home:		
Not working	42	28.37
Working	106	71.62
Family support:		
Yes	110	74.32
No	38	25.68
Social interaction with others:		
Yes	111	75.00
No	37	25.00

Figure 1. Depression among the Older Adult Residents at Geriatric Homes (N=148).

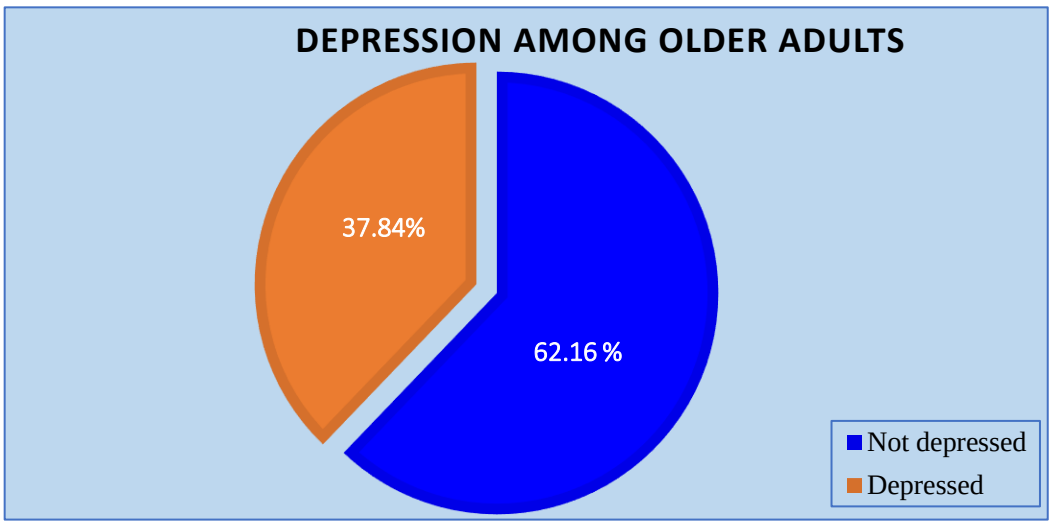

Figure 2. Function Levels of Cognition Among Older Adults Residents in Geriatric Homes (n=148)

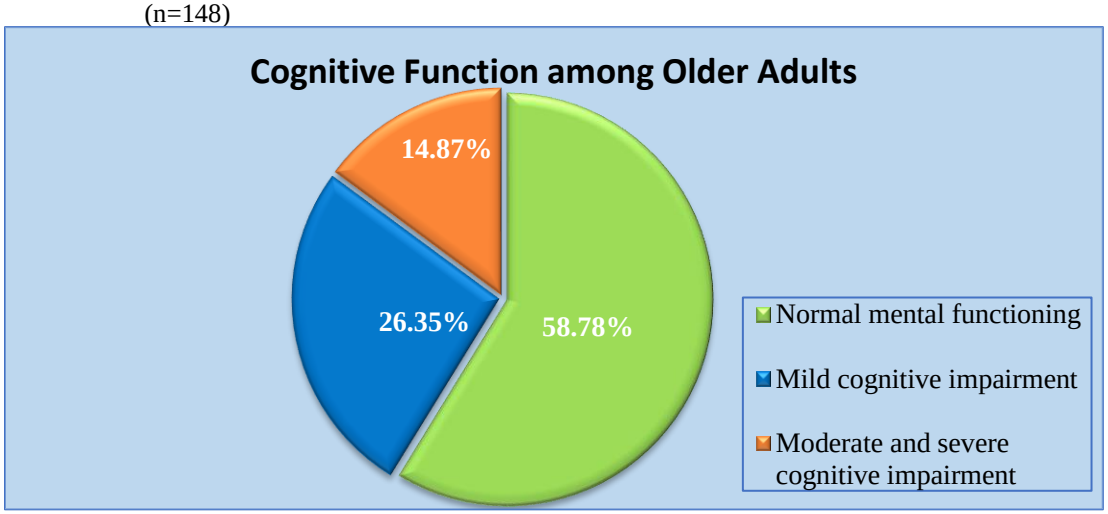

Figure 3. Nutritional Status Among Older Adults Residents in Geriatric Homes (n= 148)

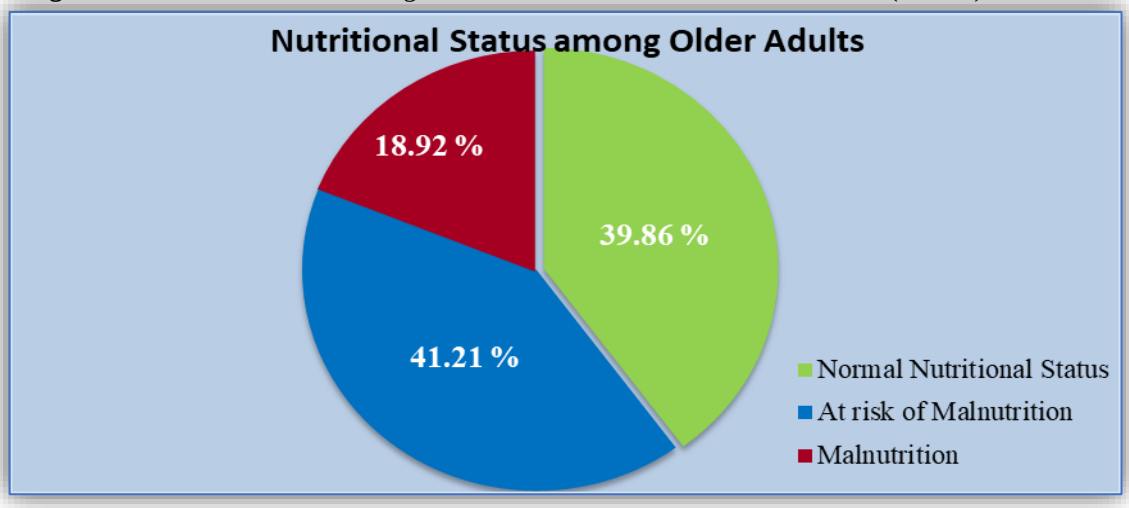

Table 2. Daily Living Activity Status of the Older Adults Residents of Geriatric Homes (n= 148)

Activities of Daily Living	Independent		Dependent	
	No	%	no	%
Bathing	60	40.54	87	59.46
Dressing	69	46.62	79	53.38
Toileting	64	43.24	84	56.76
Transferring	77	52.02	71	47.97
Continence	79	53.38	69	46.62
Feeding	110	74.32	38	25.68
Mean ± SD = 3.22±1.788				

Figure 4. Functional Levels of Activity of Daily Living among Older Adults Residing at Geriatric Homes (n= 148)

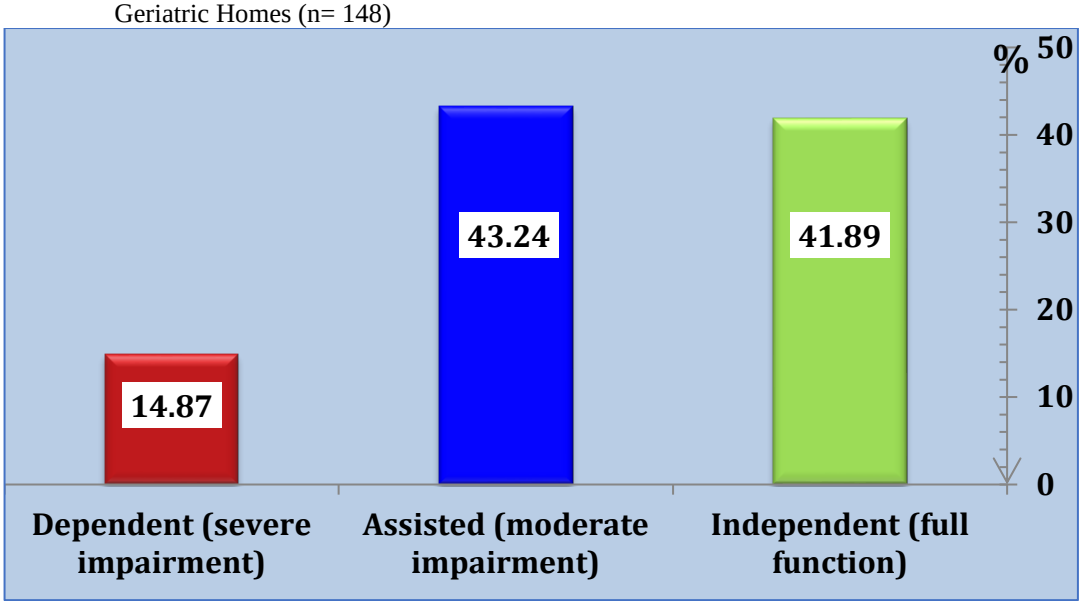

Table 3. Association Between Activity of Daily Living and Demographic Characteristics of the Older Adults Residents at Geriatric Homes (N= 148).

Variables		ADL			Total N= 148	χ2/F P- value
Demographic Characteristics	**Categories**	**Independent N= 62 n (%)**	**Assisted N= 64 n (%)**	**Dependent N=22 n (%)**	**n (%)**	
Age mean (SD)		65.90±1.93	72.59±1.89	79.09±2.61	72.52±2.14	F=389.37 **P<0.000****
Gender.	Male	41 (66.12)	31 (48.43)	8 (36.36)	80 (54.05)	χ2= 7.225 **P< 0.026***
	Female	21 (33.87)	33 (51.56)	14 (63.63)	68 (45.95)	
Education level	Non-literate	10 (16.13)	12 (18.75)	7 (31.81)	29 (19.59)	χ2=21.307 **P<0. 001****
	Primary school	9 (14.51)	29 (45.31)	8 (36.36)	46 (31.08)	
	Secondary school	30 (48.39)	17 (26.56)	6 (27.27)	53 (35.81)	
	University education	13 (20.96)	6 (9.37)	1 (4.55)	20 (13.51)	
Marital status before entering the geriatric home	Single	9 (14.51)	9 (23.44)	5 (22.73)	23 (15.54)	χ2= 4.869 P = 0.560
	Married	3 (4.84)	3 (7.81)	3 (18.18)	9 (6.08)	
	Widow/Widower	44 (70.96)	46 (56.25)	11 (45.45)	101(68.24)	
	Divorced	6 (9.67)	6 (14.03)	3 (13.63)	15 (10.14)	
Occupation before entering the geriatric home	Working	45(72.58)	47 (73.46)	14 (63.63)	106 (71.62)	χ2=0.8221 P=0. 662
	Not working	17 (27.42)	17 (26.56)	8 (36.36)	42 (28.38)	
Family support	Yes	46 (74.19)	45 (70.34)	15 (68.18)	110 (74.32	χ2= 0.383 P= 0.825
	No	16 (25.80)	19 (29.68)	7 (31.82)	38 (25.68)	
Social interaction	Yes	57 (91.93)	49 (76.56)	5 (22.72)	111 (75.00)	χ2=41.627 **P<0.000****
	No	5 (8.07)	15 (23.47)	17 (77.27)	37 (25.00)	

ADL= Activity of Daily Living
(*) Statistically significant at p<0.05
(**) Statistically highly significant at p<0.01

Table 4. Relationship between Activity of Daily Living and Heath Related Variables among the Older Adults Residents at Geriatric Homes (n= 148).

Variables		Activity of Daily Living (ADL)				
Reported Health Conditions	**Categories**	**Independent N= 62**	**Assisted N= 64**	**Dependent N=22**	**Total N= 148**	**χ2/F P-value**
		n (%)	**n (%)**	**n (%)**	**n (%)**	
Morbidity:						
Diabetes Mellitus.	No	37 (59.68)	39 (60.94)	12 (54.54)	88 (57.86)	χ2=0.279 P=0.869
	Yes	25 (40.32)	25 (39.06)	10 (45.46)	60 (40.54)	
Hypertension	No	28 (45.16)	27 (42.19)	10 (45.45)	65 (43.92)	χ2=0.137 P=0.933
	Yes	34 (54.84)	37 (57.82)	12 (54.54)	83 (56.08)	
Heart disease	No	48 (77.42)	42 (65.63)	14 (63.64)	104 (70.28)	χ2=2.641 P= 0.266
	Yes	14 (22.58)	22 (34.37)	8 (36.36)	44 (29.72)	
Cerebrovascular stroke (CVS)	No	60 (96.77)	58 (90.62)	9 (40.91)	127 (85.81)	χ2=43.767 **P< 0.000****
	Yes	2 (3.23)	6 (9.38)	13 (59.09)	21 (14.19)	
Arthritis and musculoskeletal problems	No	39 (62.91)	19 (29.69)	8 (36.37)	66 (45.00)	χ2=14.770 **P<0.000****
	Yes	23 (37.09)	45 (70.31)	14 (63.63)	82 (55.40)	
Respiratory disease	No	32 (51.61)	45 (70.31)	13 (59.09)	90 (60.81)	χ2=4.652 P=0.097
	Yes	30 (48.39)	19 (29.69)	9 (40.91)	58 (39.19)	
Cancer	No	62 (100.00)	63 (98.44)	21(95.46)	146 (98.65)	χ2=0.838 P=0.657
	Yes	0 (0.00)	1(1.56)	1(4.54)	2 (1.35)	
Polypharmacy	Mean (SD)	2.952±1.480	3.523±1.67	3.913±1.69	3.462±1.61	F=4.272 **P<0.017***
History of Falls	No	34 (54.84)	35 (54.69)	12 (54.54)	81 (54.73)	χ2=0.0006 P=0.999
	Yes	28 (45.16)	29 (45.31)	10 (45.46)	67 (45.27)	
Smoking status	Non-smoker	42 (67.74)	47 (75.00)	10 (45.45)	99 (66.89)	χ2=40.705 **P<0.000****
	Ex-smoker	2 (3.22)	15 (23.43)	12 (54.54)	29 (19.59)	
	Smoker	18 (29.03)	2 (3.13)	0 (0.00)	20 (13.51)	
Sleeping problems	No	40 (64.52)	43 (67.18)	12 (54.54)	93 (62.84)	χ2=1.1433 P= 0.564
	Yes	22 (35.48)	21 (32.81)	10 (45.46)	55 (37.16)	

ADL= Activity of Daily Living

(*) Statistically significant at p<0.05

(**) Statistically highly significant at p<0.01

Table 5. Relationship between Activity of Daily Living and Intrinsic Capacity Factors among the Older Adults Residents at Geriatric Home (n= 148)

Variables		Activity of Daily Living (ADL)				
Intrinsic Capacity Factors	**Categories**	**Independent N= (62)**	**Assessed N= 64**	**Dependent N=22**	**Total N= 148**	**χ^2 P-value**
		n (%)	**n (%)**	**n (%)**	**n (%)**	
Depression	Not depressed	40 (64.51)	39 (60.97)	13 (59.09)	92 (62.16)	χ^2=0.2751 P < 0.871
	Depressed	22 (35.49)	25 (39.03)	9 (40.90)	56 (37.84)	
Cognition	Normal mental functioning	45 (72.58)	38 (59.37)	4 (18.18)	87 (58.78)	χ^2=46.511 **P<0.000****
	Mild cognitive impairment	17 (27.42)	17 (26.56)	5 (22.72)	39 (26.35)	
	Moderate & sever cognitive impairment	0 (0.00)	9 (14.06)	13 (59.09)	22 (14.87)	
Nutrition	Normal nutritional status	33 (53.22)	23 (35.93)	6 (27.27)	59 (39.86)	χ^2= 24.27 **P<0.000****
	At risk of Malnutrition	26 (41.93)	27 (42.19)	5 (22.72)	61 (41.21)	
	Malnutrition	3 (5.00)	14 (21.87)	11 (50.00)	28 (18.92)	
Mobility	Ambulate without aids	40 (64.52)	8 (12.50)	0 (0.00)	48(32.43)	χ^2=138.35 **P<0.000****
	Ambulate with help or using aids (can, wheelchair)	22 (35.48)	56 (87.50)	7 (31.82)	83 (56.08)	
	Bed ridden	0 (0.00)	0 (0.00)	15 (68.18)	17 (11.49)	
Sensory Functions:						
Hearing	No problem	38 (61.29)	47 (73.44)	11 (50.00)	96 (64.86)	χ^2= 11.36 **P<0.023***
	Using hearing aids	3 (4.84)	3 (4.68)	5 (22.72)	11 (7.43)	
	Hearing difficulty and not using hearing aids.	21 (33.87)	14 (21.87)	6 (27.28)	41 (27.71)	
Vision	No problem	21 (33.87)	17(26.56)	2 (9.10)	40 (27.02)	χ^2=14.120 **P<0.007****
	Wears glasses	31 (50.00)	32 (50.00)	8 (36.36)	71(47.97)	
	Reported visual difficulties and not using eyeglasses.	10 (16.13)	15 (23.44)	12(54.54)	37 (25.00)	

(*) Statistically significant at p<0.05
(**) Statistically highly significant at p<0.01

Table 6. Best Fitting Multiple Linear Regression Model for Intrinsic Capacity Variables as Predictors of Activities of Daily Living (n=148).

Coefficients[a]											
	Unstandardized Coefficients		Standardized Coefficients			ANOVA[b]		R	R2 square	95.0% Confidence Interval for B	
Model	B	Std. Error	Beta	t	Sig.	F	Sig			Lower Bound	Upper Bound
(Constant)	1.130	.172		6.571	.000	43.052	0.000[a]	.804[a]	.647	.790	1.469
Depression	-.189	.096	-.131	-1.978	.060					-.379	.000
Cognition	.378	.075	.396	5.044	.000**					.230	.526
Nutrition	.585	.056	-.588	2.523	.030*					-.196	.025
Mobility	.685	.075	.597	9.188	.000**					.537	.832
Hearing	.088	.055	.090	1.598	.112					-.021	.197
Vision	.237	.096	-.164	2.573	.015*					.048	.427

a. Predictors: (Constant), Depression, Cognition, Nutrition, Mobility, Hearing, Vision
b. Dependent Variable: ADL
(*) Statistically significant at p<0.05
(**) Statistically highly significant at p<0.01
- All requested variables entered.

Discussion

In the present study more than half of the studied elderly residents at geriatric homes were males. This result is consistent with other Egyptian studies' findings confirmed that male elders outnumber female elders (Badr & Shaheen, 2016).

Depression among elders is a common public health problem worldwide that is mostly undetected, the present study revealed that more than one-third of the studied elderlies suffered from depression which is close to the findings of a previous study conducted among the elderly population living in geriatric homes in Egypt that the prevalence of depression was 37.5% (Ahmed et al., 2014). In addition, Mirkena et al., 2018, found in their study the prevalence of depression among older adults was 41.8%.

With regard to cognitive impairment that is also one of the most common health problems for elders. The current study findings revealed that more than two-fifth of the older adults' residents at geriatric homes had a cognitive impairment. In a study by Manav, 2018, more than half of elderly people living in a nursing home had a cognitive disorder. While Ren et al., 2018, found the prevalence of cognitive impairment reached to around one third of the elderly population in Shanghai, China.

Concerning nutritional status, unfortunately, the study finding revealed a large proportion of poor nutrition among the studied older adults' residents at geriatric homes, nearly one-fifth of them were malnourished and, more than double of this percentage were at risk, while just over one third had normal nutrition according to their MNA scores. This result is similar to the study of Elghazally and Saied, 2019 who found in their Egyptian study that 46.4% of old age home residents were at risk for malnutrition and 19.6% were malnourished. The study carried out among the geriatric population of the South-Central Part of Nepal by Sharma et al., 2021 found that 34.3% had normal nutritional status.

The capacity for performing ADLs is an important indicator of self-dependency and disability. The presented study revealed a high prevalence of ADLs functional difficulties, more than half of the studied older adults' residents at geriatric homes suffer varies ranges of ADLs impairment, more than one-tenth of them were fully dependent and the rest were classified as partially independent (assisted). This result didn't differ much from an Egyptian study conducted among elderlies in residential homes by El-Bilsha, 2018, who found the same result. Moreover, Rasheedy & Abou-Hashem, 2020, found that approximately two-thirds of the elders had a functional impairment that was slightly higher than the result of our current study**.** However, the prevalence of functional impairment in this study was relatively higher than those of the community-based studies; as shown by Al-Musafri & Shah, 2016, in which less than one-third of the studied Emirati senior citizens had ADLs impairment. In general levels of ADL dependence are higher in institutionalized elderly when are compared to results in community-dwelling older people. This could be due to older people are often institutionalized when disability is high that it is not possible to take care of them at home.

According to the finding, bathing ranked as the highest order of ADLs impairment among older adults followed by toileting then dressing. While feeding was the lowest order of dependency of ADLs. In fact, some of the activities of daily living such as bathing may be considered as complex activities, requiring a lot of coordination, balance, and muscle strength. This result is consistent with other several studies of Okabe et al., 2021, who found that the highest difficulties in ADL were for bathing and grooming, while eating was lowest ADLs limitation.

The current study findings demonstrated that socio-demographic characteristics have a significant impact on ADL levels, as shown that age is an independent risk factor associated with impairment of ADL that is much higher with advanced aged. This is consistent with Sozańska et al., 2019, who found that with each subsequent year of life, the risk of having problems with ADLs increased by 8%.

Gender is another independent factor significantly associated with ADLs; in which dependency and impairment of ADLs was higher among women than men elders. This could be due to behavioral activities of woman,

in which they are more likely to have a higher proportion of body fat, and lower proportion of lean body mass, tend to present lower performance of physically demanding activities. In addition, women elders have higher life expectancy than men elders, and these added years tend to be associated with impairment of ADLs. This result is in agreement with the studies of Chauhan et al., 2022 and Urrea et al., 2017, who found that female older adults have higher ADL limitation than male elderly. Conversely, the study of Okabe et al., 2021, found a higher rate of dependency of ADL among men elders than women elders. In addition, Abbasian, 2016, found no significant association between sex and Katz score**.** The differentiation of this result could be related to the difference between studies settings and various culture and behaviors of the different countries.

Interestingly, a significant relation was also found between social interaction and ADLs; independence is higher among socially active elders. Active participation in social activities is very important for older adults and positively influences their psychophysical condition which in turn leading to better functional ability. This result is supported by Bai et al., 2020, who reported that a higher level of social connection was associated with better elderly functional ability

In this study, the educational level is the remained variable of demographic data associated significantly with ADLs, in which dependency is increased with the lower education level and vice versa. This could attribute to those individuals with higher educational levels are less likely to expose themselves to risk factors for diseases. In addition, educated people usually seek medical services more often, and show greater compliance and participation in health care plans. This result is in agreement with the finding of Ali et al., 2017.

Among investigated health-related variables in the current study, chronic diseases including stroke, arthritis and musculoskeletal problems are significantly associated with functional impairment of ADLs among older adults. This is corresponding with Raina et al., 2020, who found that musculoskeletal disorder is associated with disability. Moreover, Hu et al., 2019, found that stroke is strongly associated with the functional disability of ADLs. The consistency of these findings with those of other studies of functionality in elders indicates the importance of preventing and treating chronic conditions in a timely way to promote independence among older adults.

Noteworthy, the current study finding proved that polypharmacy was also a major predictor of functional ability; the result revealed that the dependency of ADLs is significantly higher among those with a higher mean score of poly-pharmacy. This finding is in agreement with Bakhshwin, 2018, who found that polypharmacy was significantly associated with functional decline in older adults.

The current study showed a significant association between smoking and disability among older adults. One of the surprising information that came up with this research is that the highest percentage of ADL disability either dependent or partially dependent was found among the ex-smoker group, not among the smoker group, this is might be clarified that the persons regrettably tend to take initiative actions and stop risky behaviors such as smoking after a deterioration of health and complication has occurred. Thereby there is a need for disseminating and enhancing awareness about the importance of primary prevention. This result agrees with Fan & Lee, 2015**,** who found a positive association between smoking, smoking cessation, and physical functional disability. Otherwise, the result is contradictory with Al-Musafri & Shah, 2016 who found no significant association between smoking and the functional capacity of the elderlies.

At the core of functional ability are the physical, psychological, and cognitive intrinsic capacities of the individual. Multiple regression model showed a strong statistically significant association between cognitive impairment and ADLs among older adults. This suggests that intellectual activity and good cognitive function are critical for healthy aging and successfully engaging in the various activities of daily living. This is in agreement with previous researches which found that cognitive functioning was independently associated with ADL disability declines (McGrath et al., 2020). Besides, Mattos

et al., 2014 found that cognition was an explanatory variable of ADL dependence. Based on these results, early and adequate evaluation and treatment of cognitive problems are suggested.

Regarding sensory functions, visual impairment is another explanatory variable of IC factor influencing functional performance; maintaining its statistical significance in the regression model. ADL difficulties dependency score was significantly associated and higher among elders with self-reported visual difficulties and not using eyeglasses, where eyeglasses work as a protector against functional impairment. On the other hand, hearing did not stay in the final explanatory model. This result is consistent with Hu et al., 2020**,** who found in their chines study that vision was associated with a reduced dependency of ADLs but the hearing was not. Furthermore, the study of Pérès et al., 2017**,** illustrated that visual loss was associated with a greater functional decline over time. Consequently, screening measures for the early identification and treatment of vision disorders can be a measure for maintaining the independence of the elderly.

Concerning the role of nutritional status on functional ability, the current study finding revealed a significant association between nutrition and ability to perform ADLs; in which dependency level is higher among malnourished elders or at risk of malnutrition. Accordingly, routine screening of malnutrition and wider efforts for maintaining adequate nutrition is essential as influences on intrinsic capacity in older age. This result is verified in many previous studies from different countries. An Egyptian study conducted by Abdelrahman and Elawam 2020, revealed that functional impairment significantly associated with malnutrition. In a chines study (Hu et al., 2020), there were association between nutrition and ADL among the nursing home elderly. in addition, the Brazilians study found that dependent or partially dependent institutionalized elderlies for performing ADLs are approximately 1.6 times more malnourished or at risk of malnutrition than independent individuals (Pereiraet et al., 2015).

The present study finding showed that mobility among older adults is the fourth explanatory IC factor maintaining its strong statistical association with ADL in regression model, where functional impairment of ADL scores whether dependent or assisted were higher among elders, who were bedridden or using aids, compared with those who can ambulate without aids. This result verifies a need for promoting physically active lifestyles and all necessary measures to enhance mobility to delay losses of muscle mass and maintain physical function. This is consistent with Sozańska et al., 2018, who found in their study that elders who used assistive devices had an almost 3-times higher odds ratio to develop limitations to ADL. In addition, Mattos, 2014, found a strong association between walking in mobility assessments and ADL.

Even though the present study finding didn't show a significant association between the depression variable of IC and ADLs, many other research studies found that depression is a significant predictor for functional disability. Indeed, the relationship between depression and level of functional status is bidirectional and complex. Some studies suggest that depression leads to functional decline (El-Bilsha, 2018 and Sozańska et al., 2018). But others suggest that functional decline leads to depression (Weil et al., 2014). So that, the lack of significant influence of depression variable on ADL is one of the unexpected findings in this study. According to the longitudinal study conducted by Mehta et al., 2002, depression was a risk factor for functional loss among community-dwelling older adults who are independent in ADLs, but not for those who already had some functional decline. Since this study was cross-sectional, the more depressed older adults could be at risk for future functional loss of ADLs which is not yet evident. This result agrees with the findings of Aguiar et al., 2019, in which depressive symptoms was not associated with functional disability for ADLs.

Limitations

Some difficulties were faced during the data collection, as some older adults unable to respond to the questions, so the required data was obtained from immediate caregivers who were family members or institutional caregivers. Also, for the participants' low formal education

or unable to read the questionnaire for any reason the researcher read the the questionnaire loudly to ensure the comprehension and validity of patients' report.

Conclusion

In conclusion, this study revealed a high prevalence of ADL impairment among older adults living in geriatric homes. ADL is affected by several numbers of modifiable and nonmodifiable risk factors. Among them, sociodemographic variables such as age, female gender, educational level, and social interaction, in addition, the health-related variables, stroke, arthritis, musculoskeletal problems, and polypharmacy were significantly associated with ADL. Most importantly, The IC factors appear to be strong predictive of ADL, each factor was significantly associated with ADL function except for the hearing and depression factors among older adults.

Recommendation

In the light of these findings, a systematic and comprehensive approach for the measurement of IC factors should be included in comprehensive geriatric assessments.

Intervention strategies including geriatric health program should be developed by health care professionals including nurses for preventing, or slowing declines in intrinsic capacity, as well as, prevention and management of chronic conditions.

Health education program of older adults and their families should be promoted continuously with emphasis on a healthier lifestyle to mitigate the modifiable factors related to functional impairment. The practice of appropriate physical activity, healthy eating, stop smoking as well as using medicines wisely would promote autonomy. Psychosocial intervention including enhancement of active involvement in social interactions and mental activities may provide functional health benefits to older adults through improving cognitive and psychosocial pathways to a certain extent.

Further researches are recommended to investigate the association of functional capacity and IC factors among elders in community dwelling on a basis of longitudinal methodological designs.

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